Defense Acquisition University
Lunch and Learn
23 July 2014

T&E Overview

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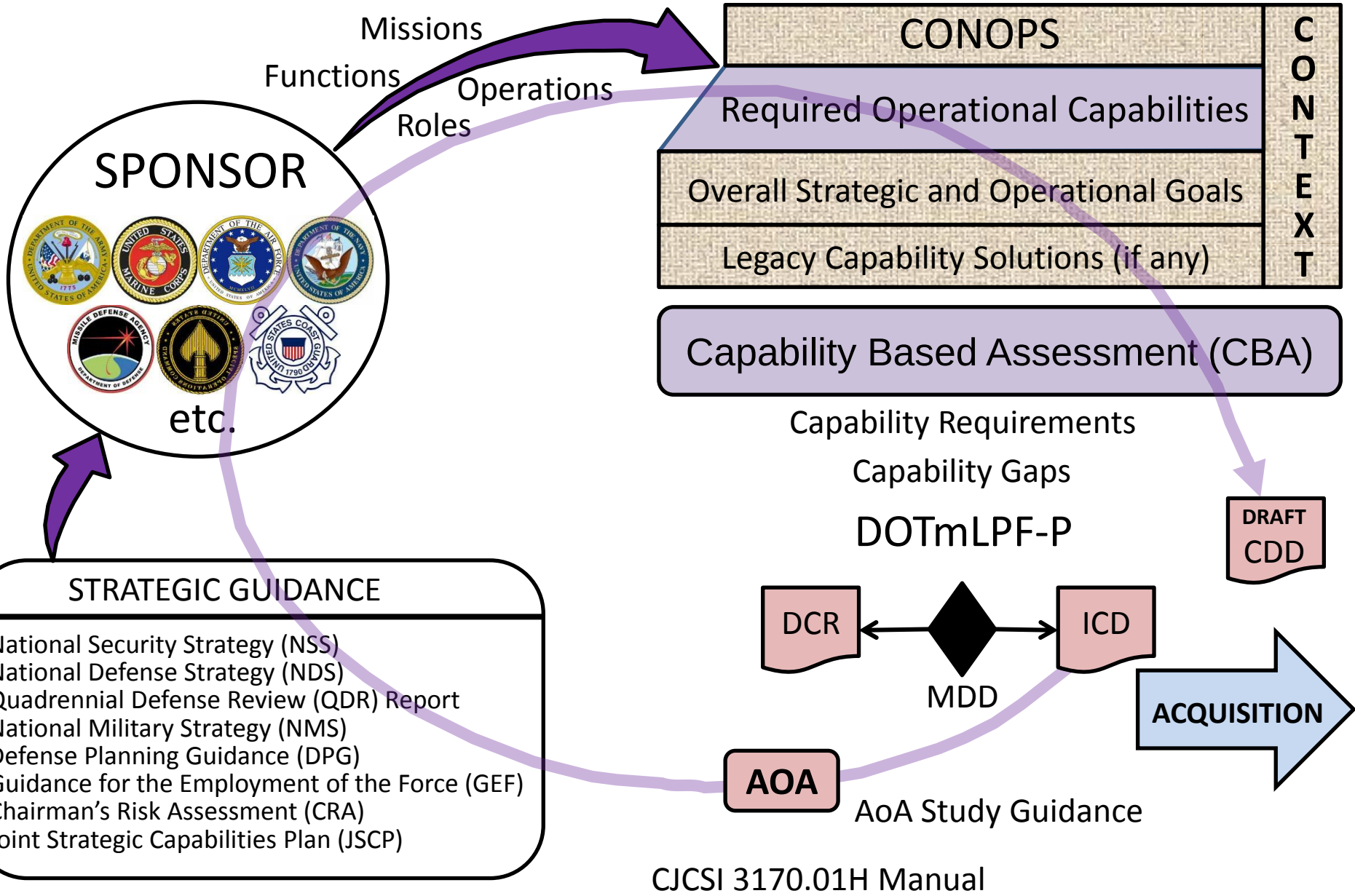
T&E Overview - Overview

Learning Objective: Recognize Implications and Impact of Requirements, Process and Policy Changes on Test and Evaluation in Support of DoD Acquisition Programs

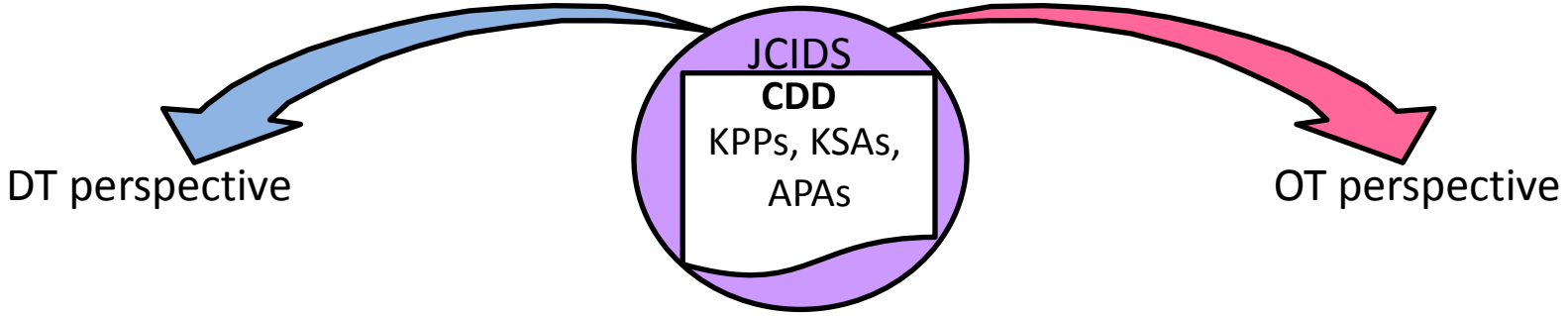
- Requirements
- Process
- Policy

REQUIREMENTS

Origin of Requirements

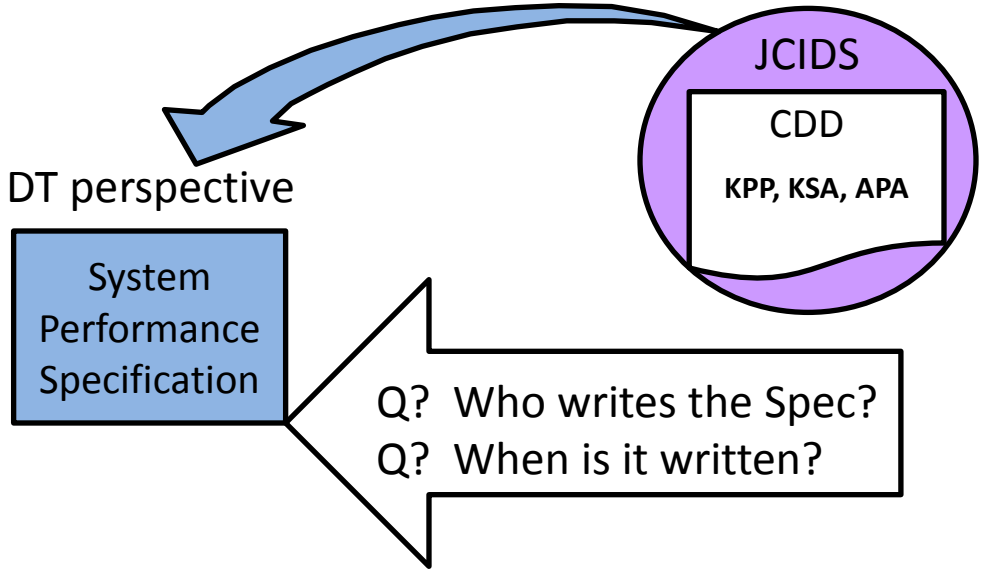


Requirements & Test Perspective



- JCIDS – Joint Capabilities Integration and Development System
- CDD – Capability Development Document
- DT – Developmental Test
- OT – Operational Test
- KPP – Key Performance Parameter
- KSA – Key System Attribute
- APA – Additional Performance Attribute

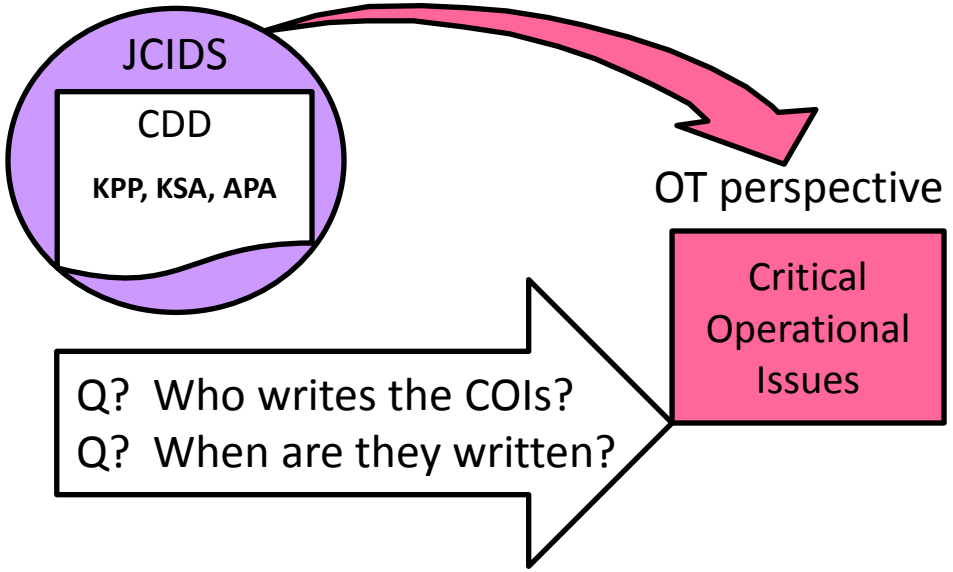
DT&E - Performance Spec



A: Who? The "Acquisition Community"
When? The System Performance Spec is usually written early in the Technology Development Phase

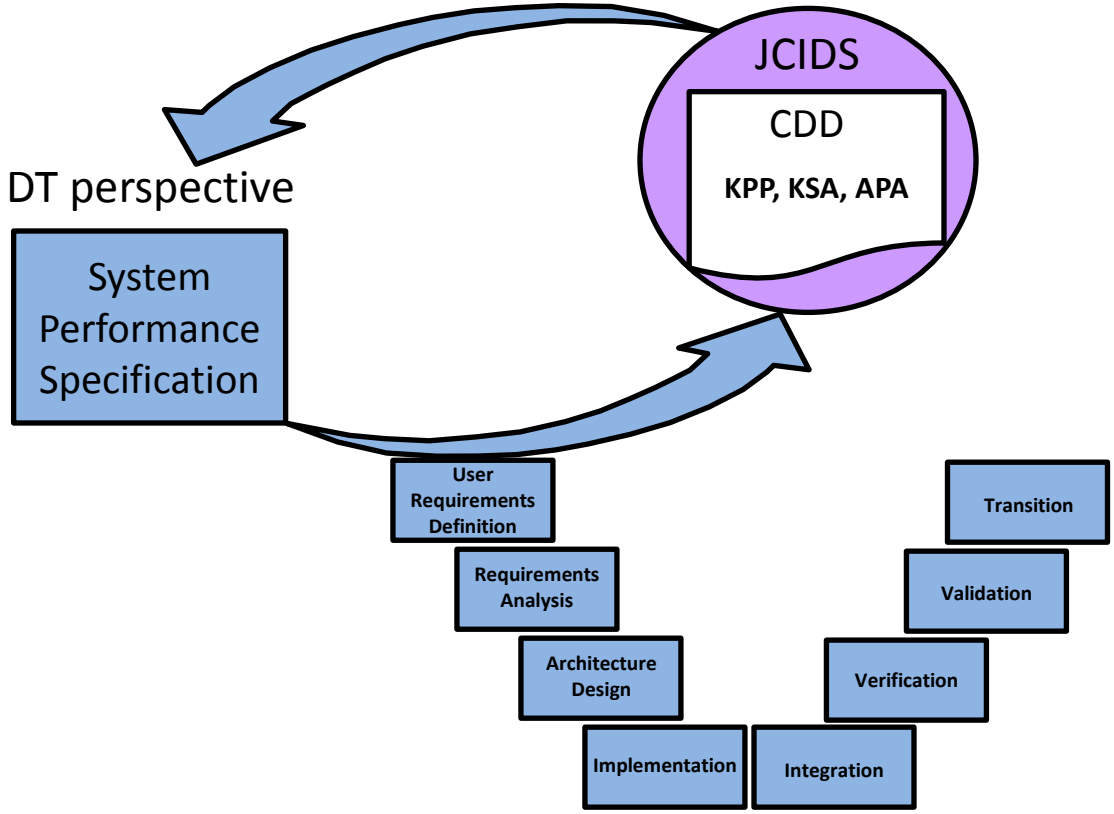
- The Government often includes the System Performance Spec in the Request for Proposal (RFP)
- Industry responds with an approach to meet the Spec in their Proposal
- The Program assures that the Requirements are understood and addressed in the design approach via the Systems Requirements Review (SRR)

OT&E – Critical Operational Issues

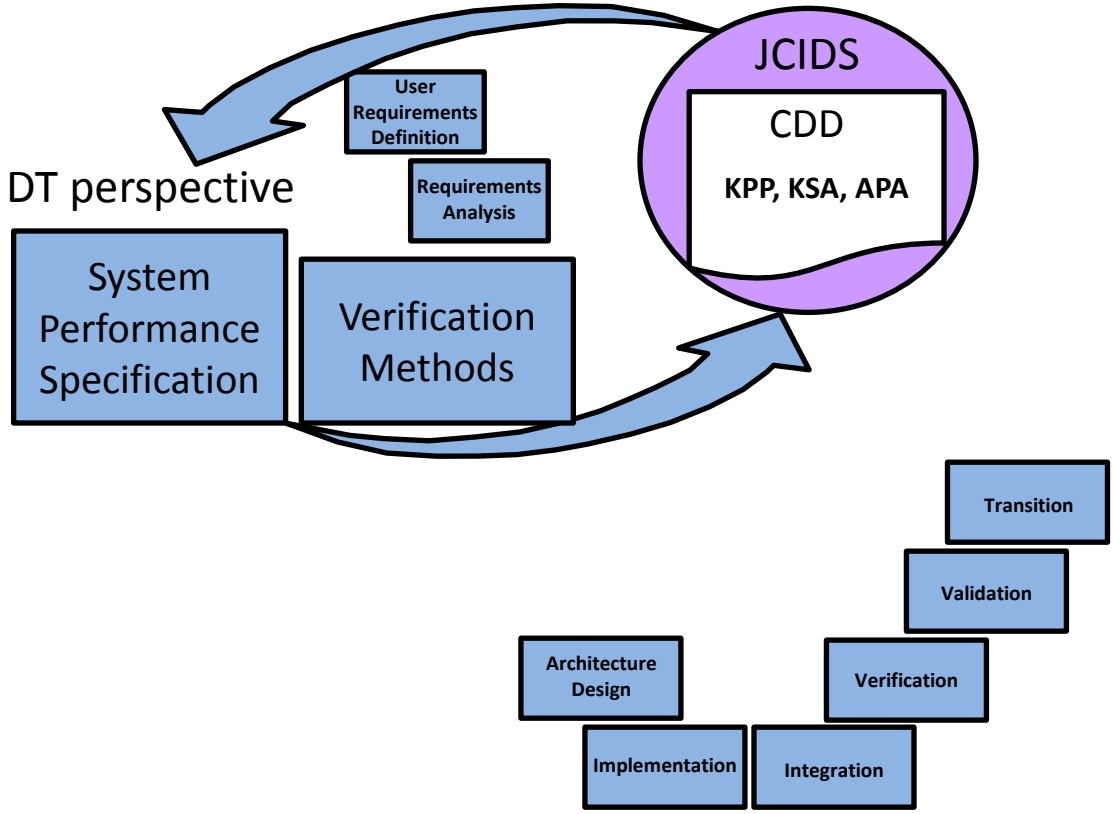


A: Who? the "OT Community" and/or "the Requirements Community"
When? COIs are needed to support the TEMP, formerly required by Milestone B, now required at Milestone A

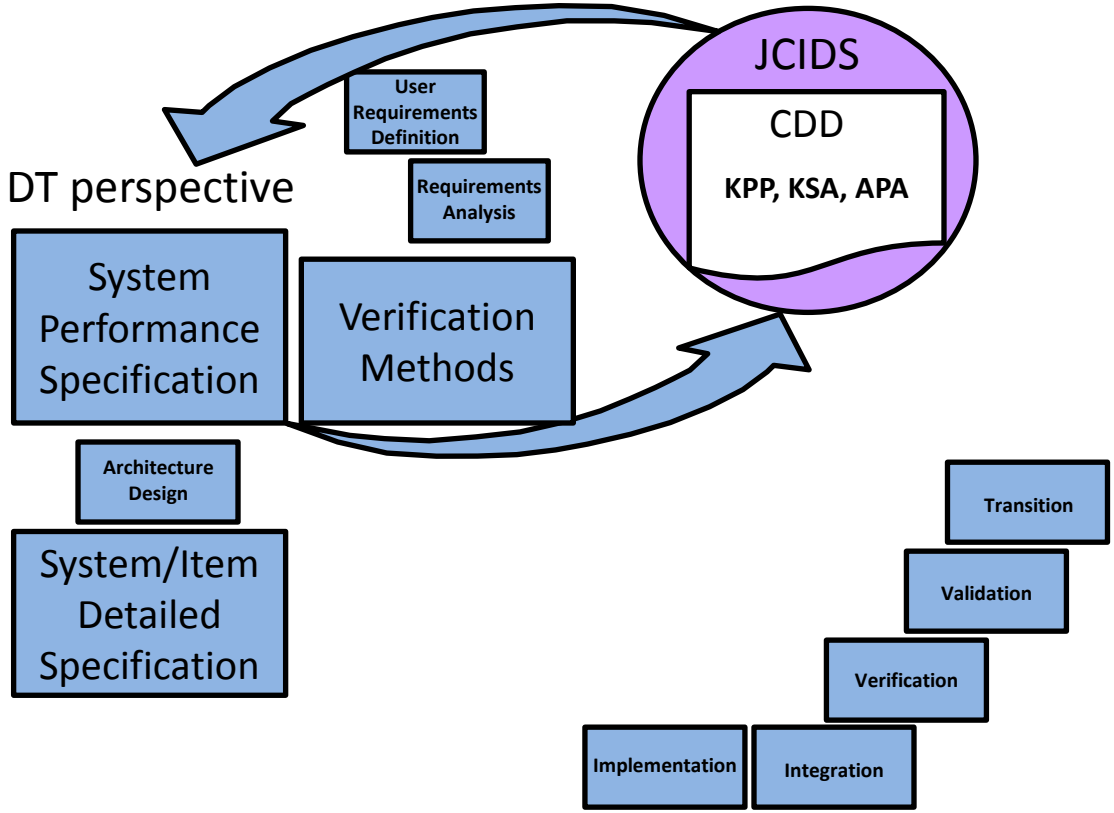
DT&E - Verification Loop of SE Process



Systems Engineering – DT&E



Systems Engineering – DT&E



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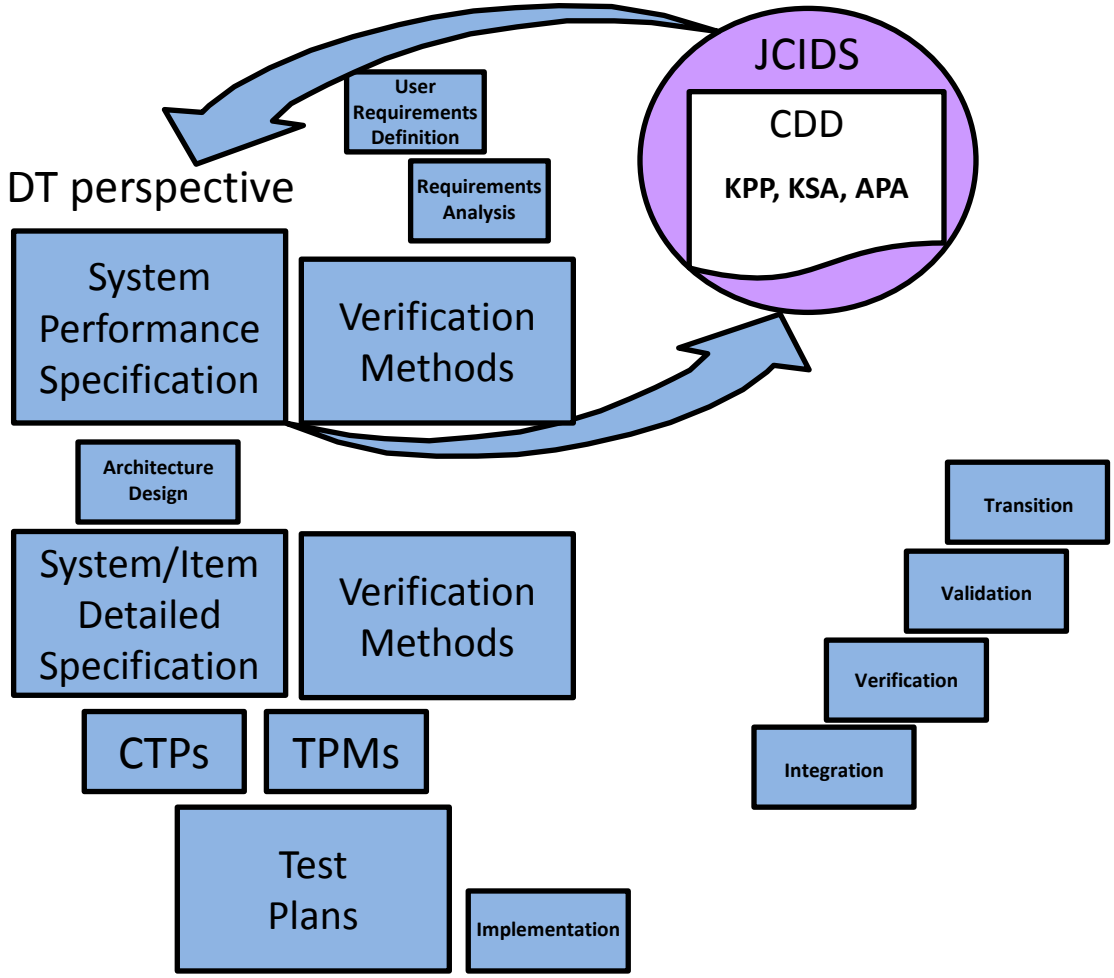
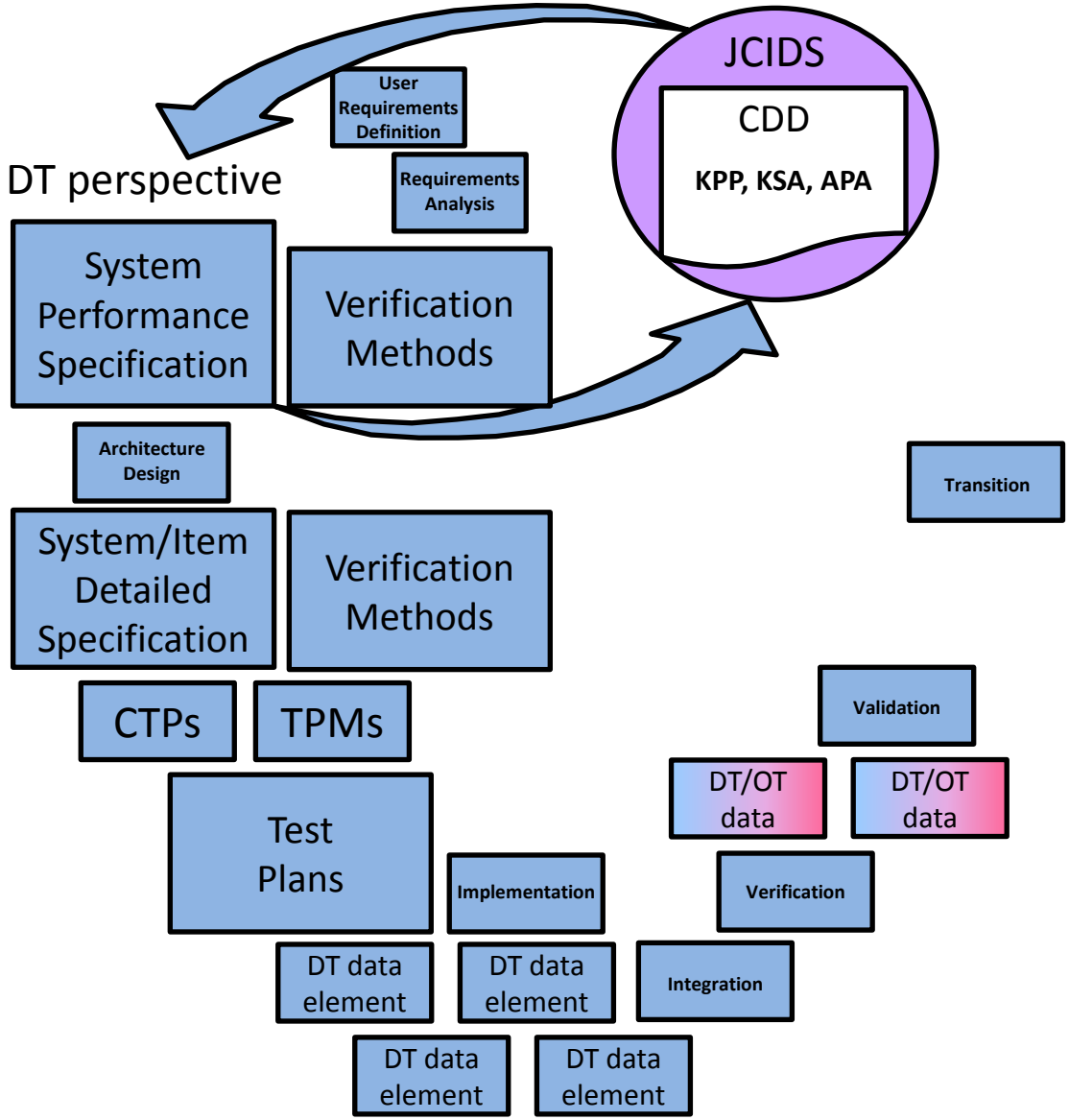
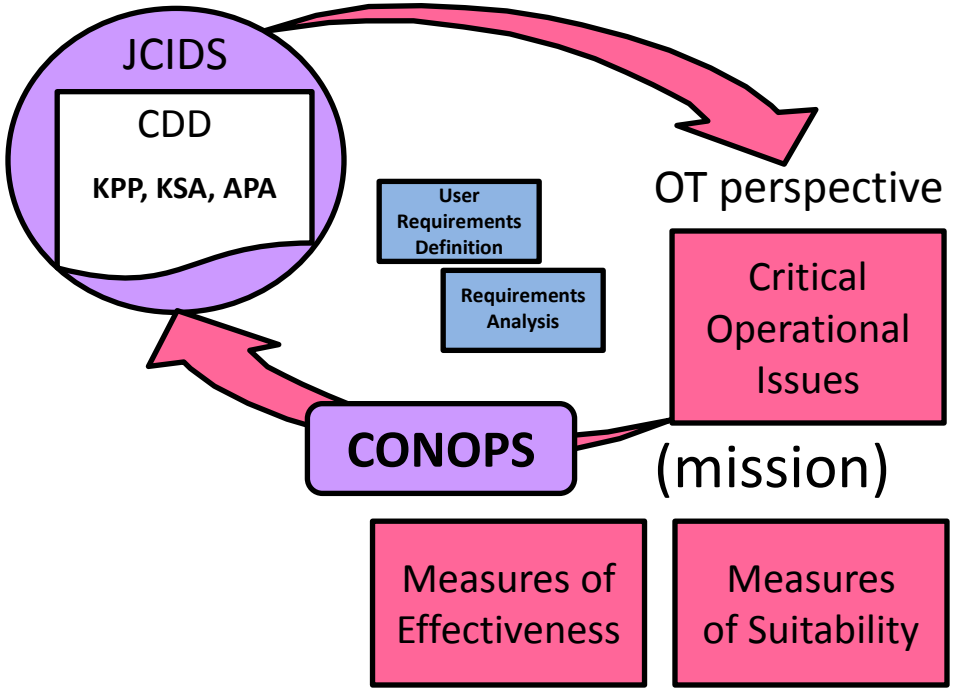


Systems Engineering – DT&E



OT&E Effectiveness/Suitability



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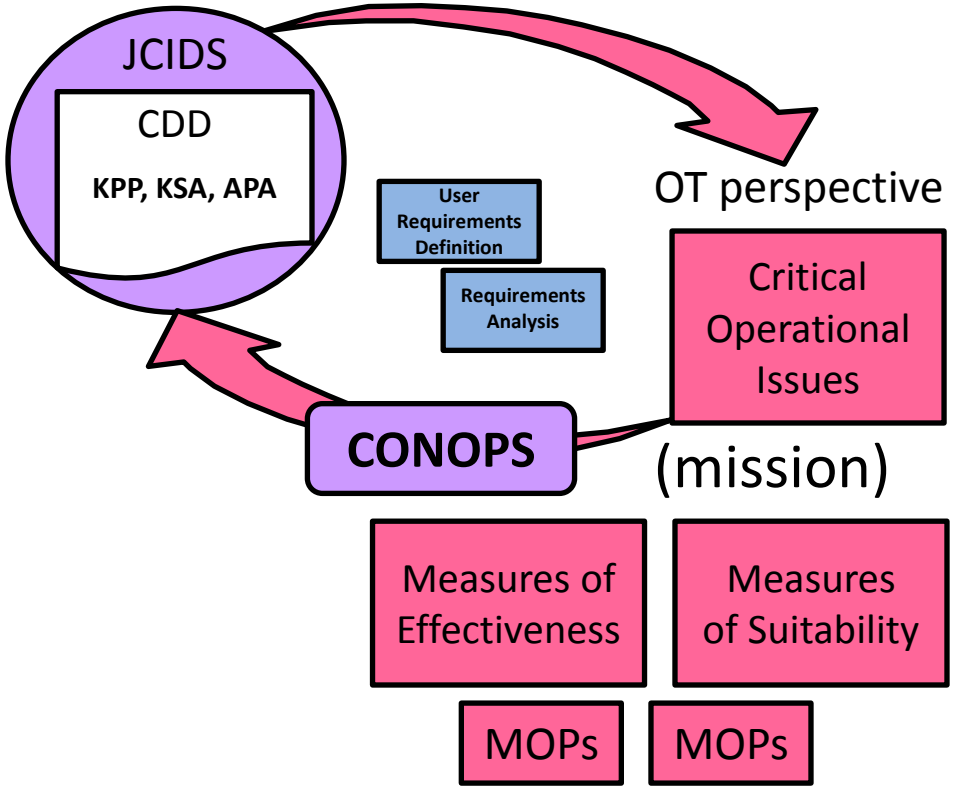
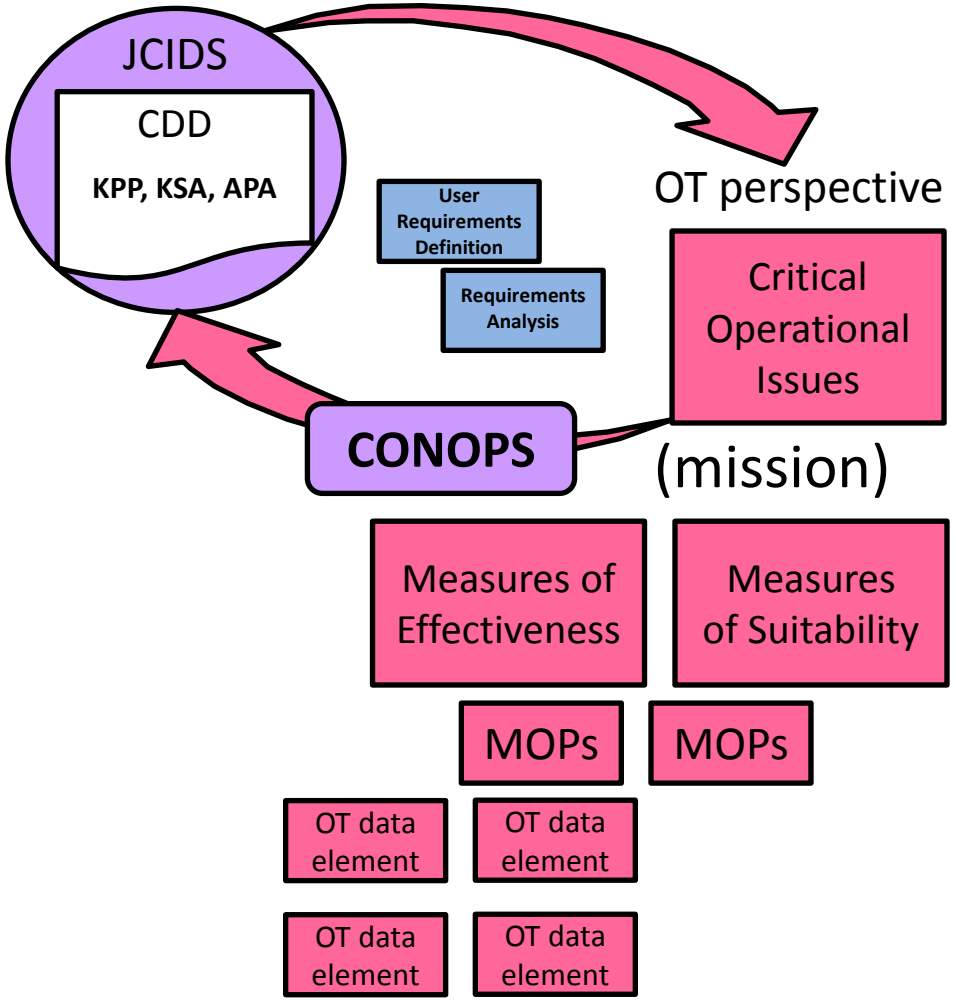
Mission – OT&E


JCIDS
CDD
KPP, KSA, APA
User Requirements Definition
Requirements Analysis
OT perspective
Critical Operational Issues
(mission)
CONOPS
Measures of Effectiveness
Measures of Suitability
MOPs
MOPs

Mission – OT&E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OT data element
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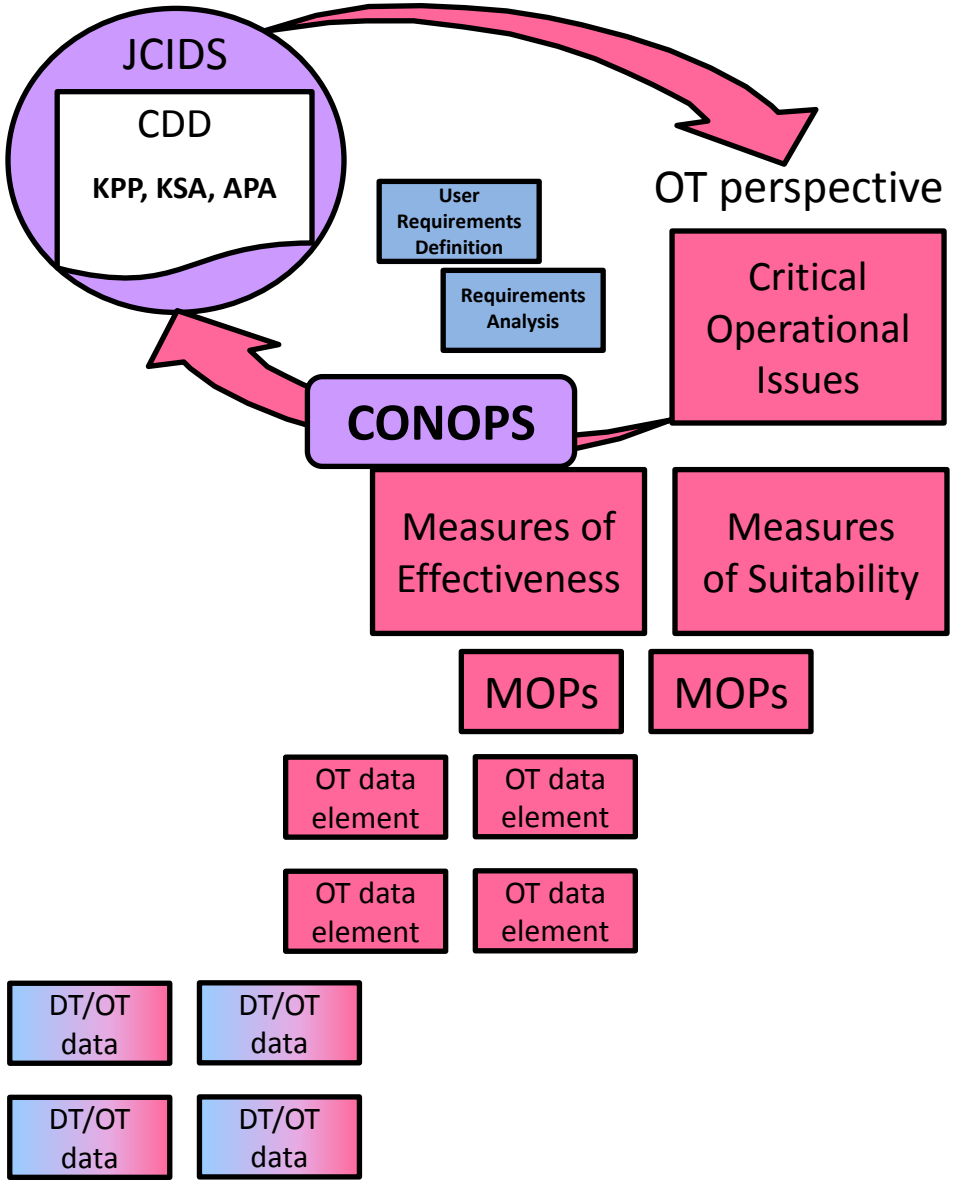
Mission – OT&E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DT/OT data
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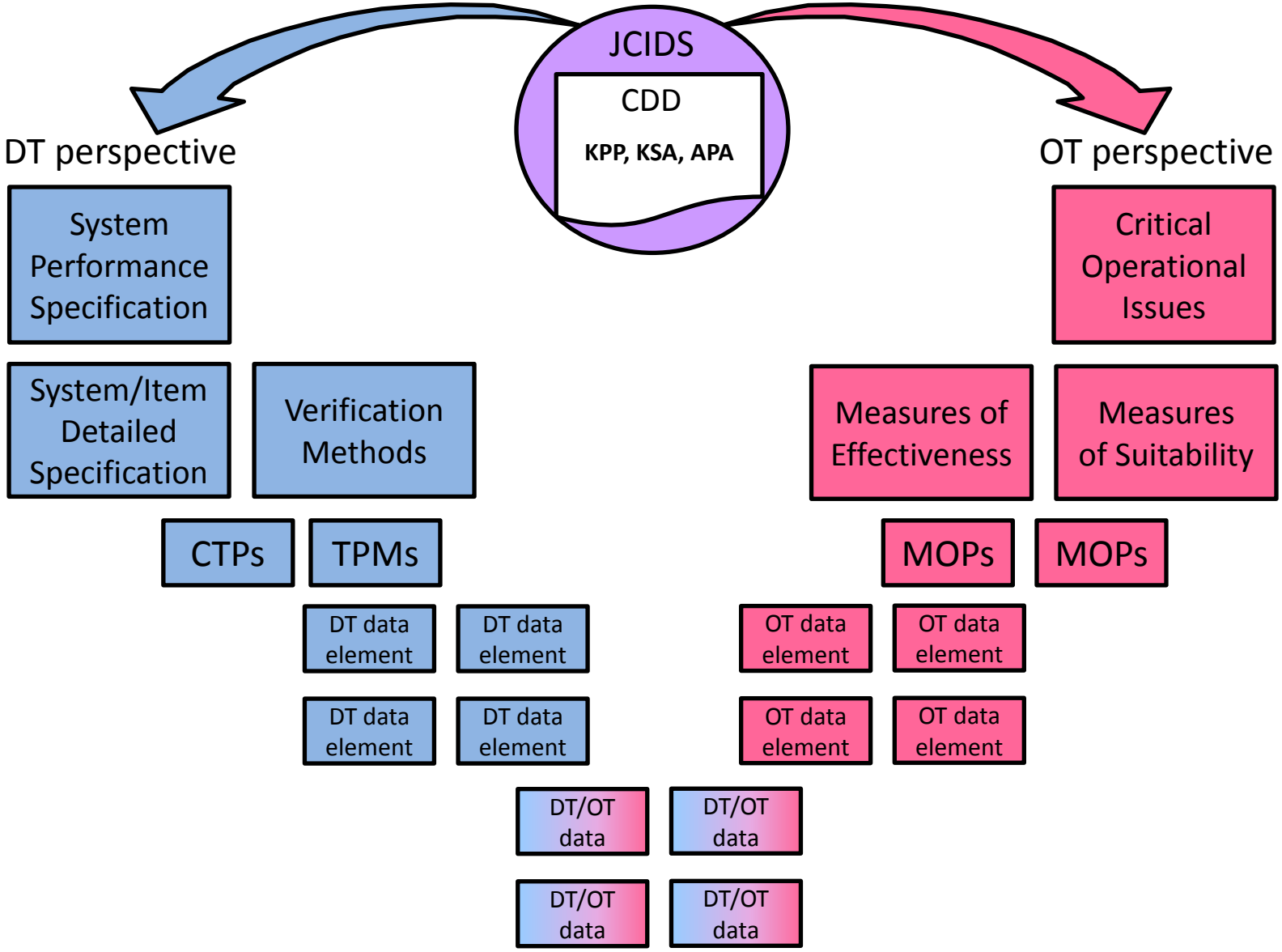
DT/OT data

DT vs OT Perspective



Test Perspective Reconciliation

JCIDS

CDD

KPP, KSA, APA

DT perspective

OT perspective

TEMP

System Performance Specification

Critical Operational Issues

EOA/OA

System/Item Detailed Specification

Verification Methods

Measures of Effectiveness

Measures of Suitability

CTPs

TPMs

MOPs

MOPs

DT data element

DT data element

DT data element

DT data element

OT data element

OT data element

OT data element

OT data element

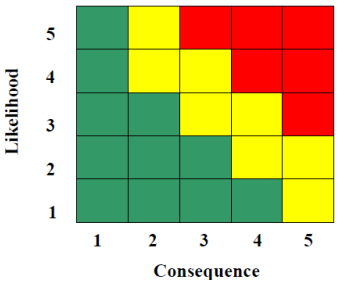
DT/OT data

DT/OT data

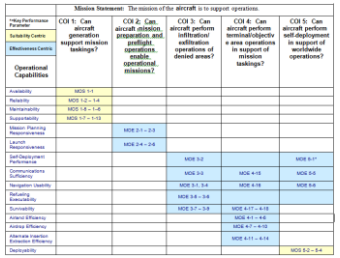
DT/OT data

DT/OT data

Program RISK

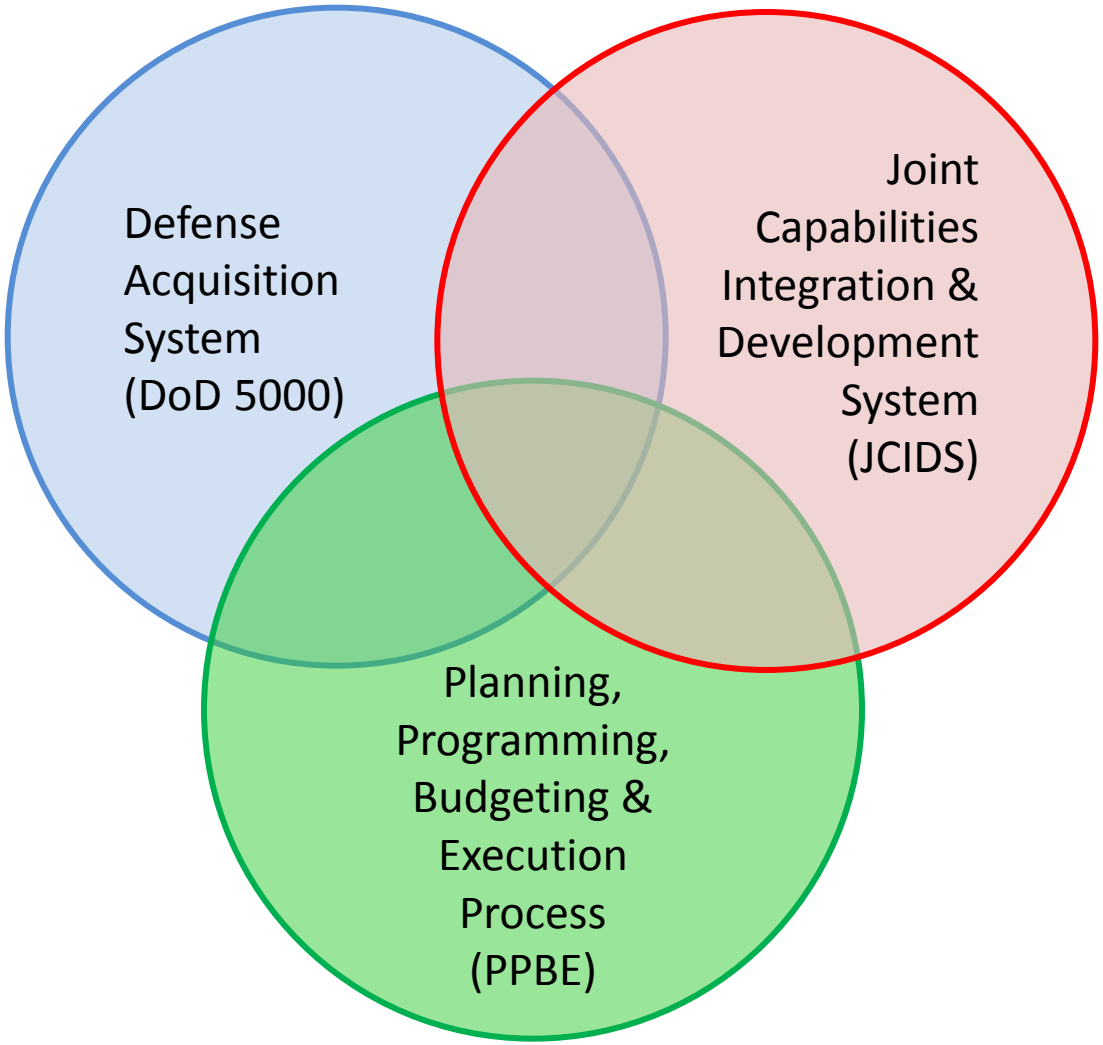


Mission RISK



PROCESS

DoD Decision Support Systems



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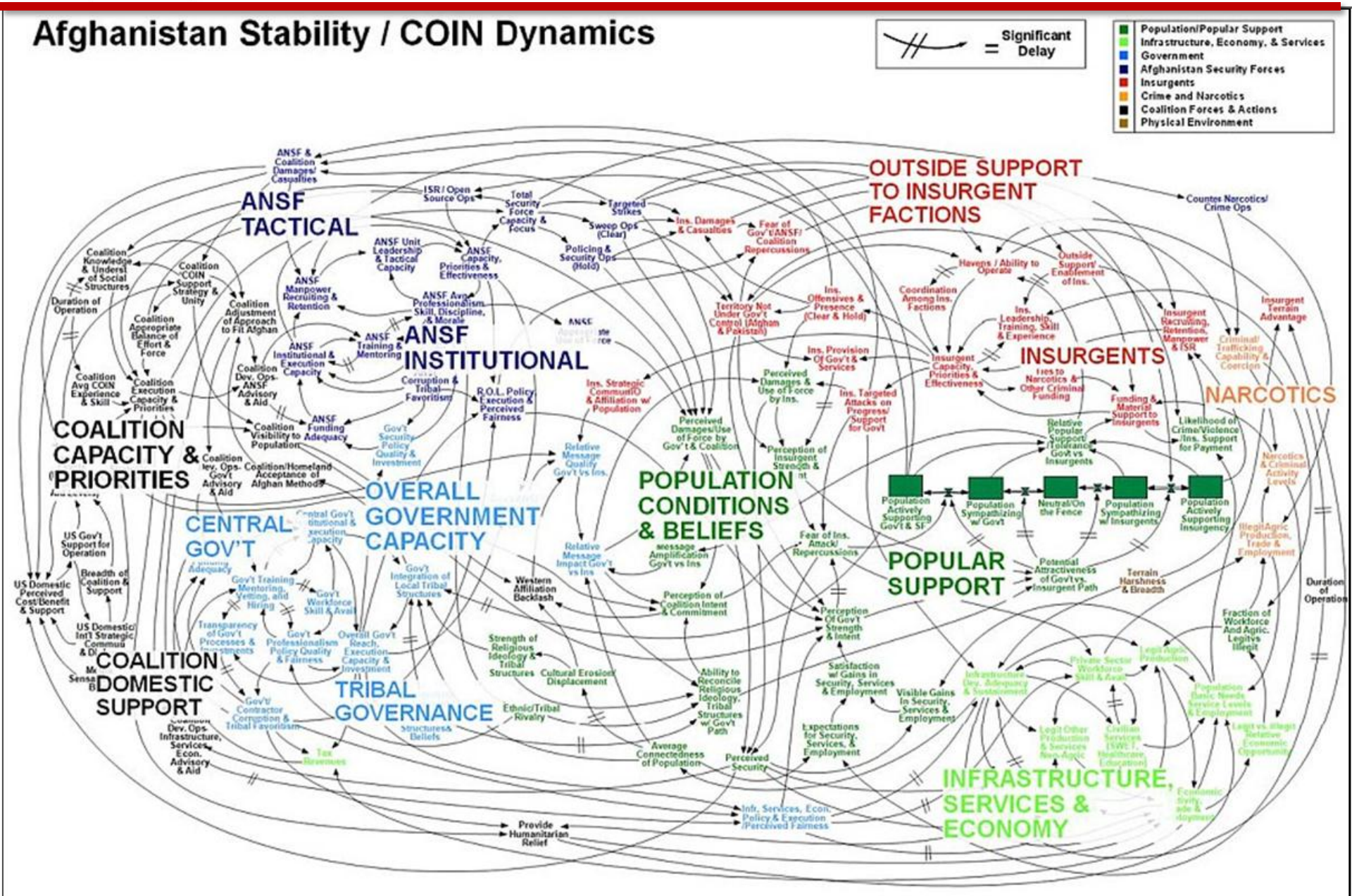
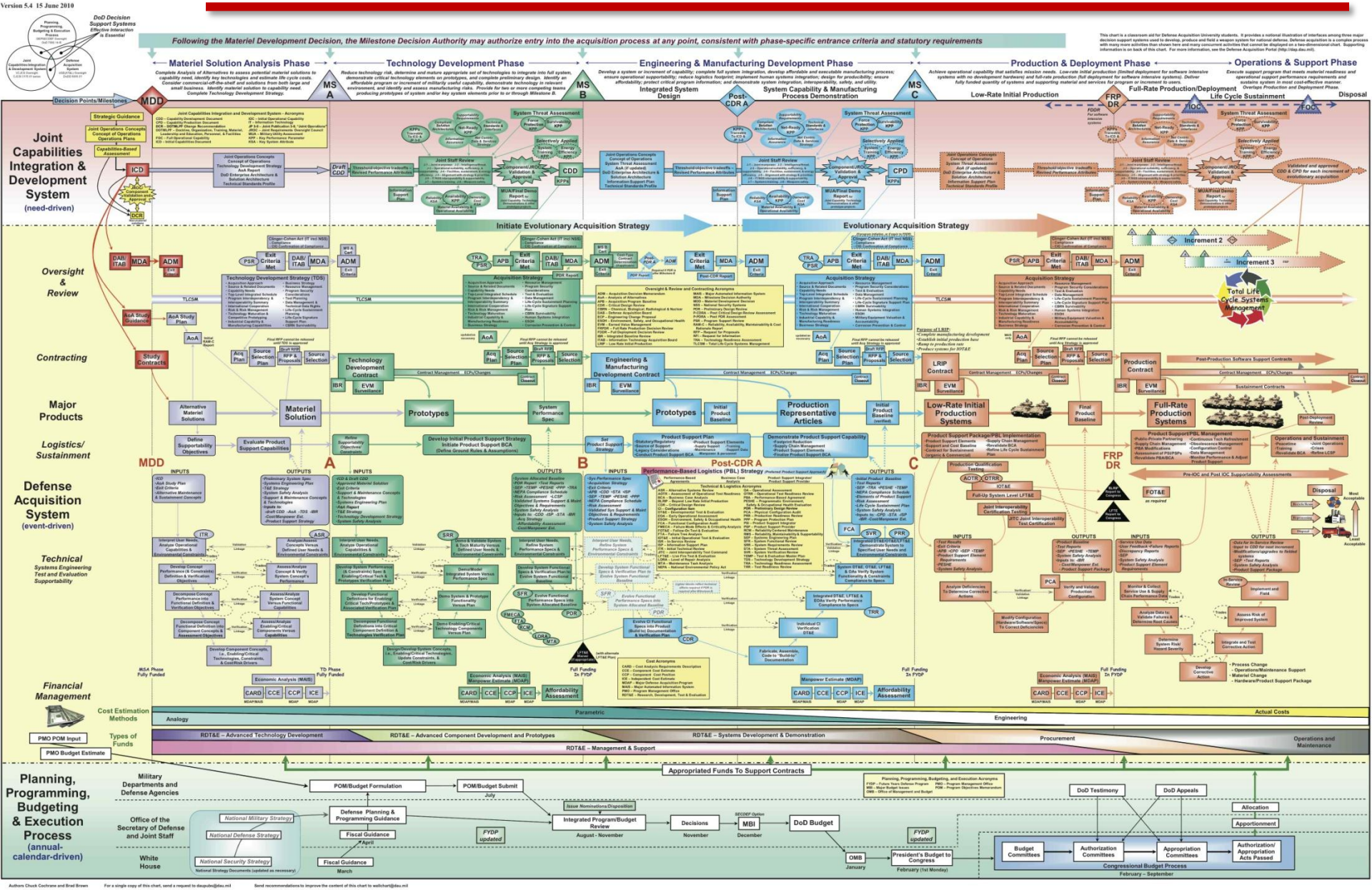
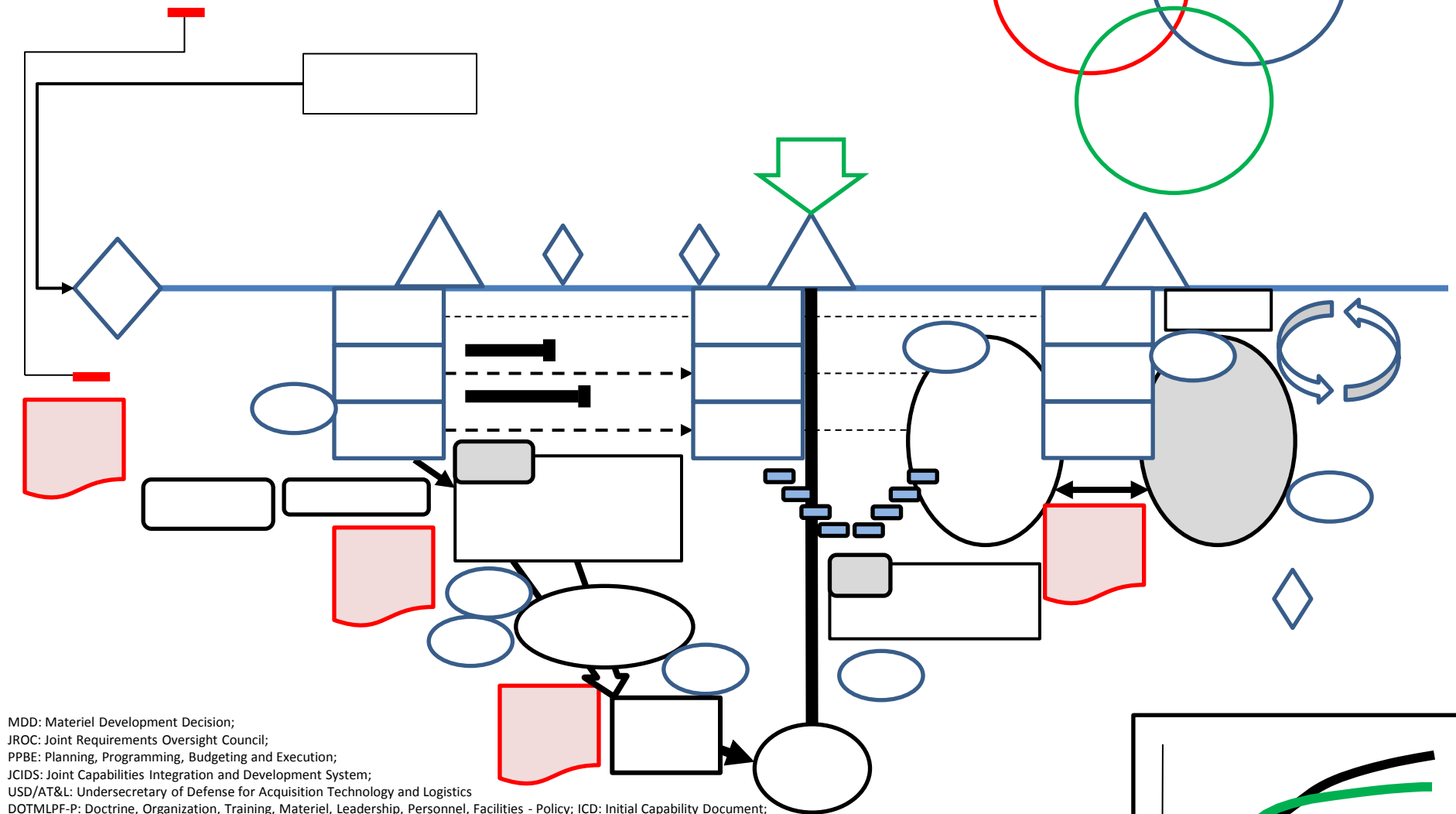
"When we understand that slide, we'll have won the war." General Stanley McChrystal

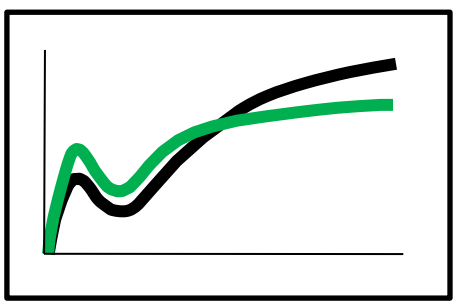


Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System



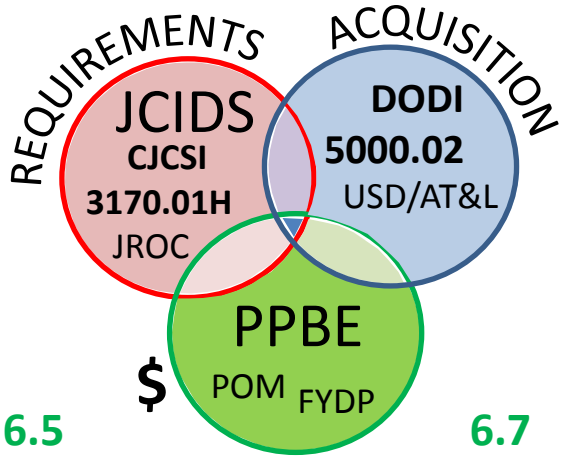
the Life Cycle Simplified





MDD: Materiel Development Decision;
JROC: Joint Requirements Oversight Council;
PPBE: Planning, Programming, Budgeting and Execution;
JCIDS: Joint Capabilities Integration and Development System;
USD/AT&L: Undersecretary of Defense for Acquisition Technology and Logistics
DOTMLPF-P: Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities - Policy; ICD: Initial Capability Document;
MSA: Materiel Solution Analysis; ASR: Alternative Systems Review; SEP: Systems Engineering Plan; DRFPRD: Development Request for Proposal Release Decision;
TDS: Technology Development Strategy; AS: Acquisition Strategy; CTs: Critical Technologies; TMRR: Technology Maturation and Risk Reduction; RDP: Requirements Decision Point
TEMP: Test & Evaluation Master Plan; TRA: Technology Readiness Assessment; TRL: Technology Readiness Level; EOA: Early Operational Assessment; CDD; Capability Development
Document; PDR: Preliminary Design Review; PI: Program Initiation; SE; Systems Engineering; EMD: Engineering & Manufacturing Development; EDMs: Engineering Development Models;
CDR: Critical Design Review; OA: Operational Assessment; DT&E: Developmental Test & Evaluation; CPD: Capability Production Document; LRIP: Low Rate Initial Production;
IOT&E: Initial Operational Test & Evaluation; FRPD: Full Rate Production Decision; ECPs: Engineering Change Proposals; POM: Program Objective Memorandum;
FYDP: Future Years Defense Program; PD: Production and Deployment; OS: Operations and Support; TO/UN: Technology Opportunities/User Needs

the Life Cycle Simplified



DOTmLPF-P

TO / UN

6.1 6.2 6.3 6.4 6.5 6.6 6.7

MSA TMRR EMD PD OS

PI

RDP CDD-V DRFPRD

FF FYDP A FF FYDP B FF FYDP C

MDD

ICD

AoA STUDY GUIDANCE

AOA

CONOPS

ASR

SEP TEMP AS

CTs

EOA

COMPETITIVE PROTOTYPES

DRAFT CDD

SFR SRR

demo

PDR

CDD

TRA

TRL

SE

6

OA

PROTOTYPES

CDR

TRR

DT&E

CPD

LRIP

OTRR

IOT&E

ECP

IPR

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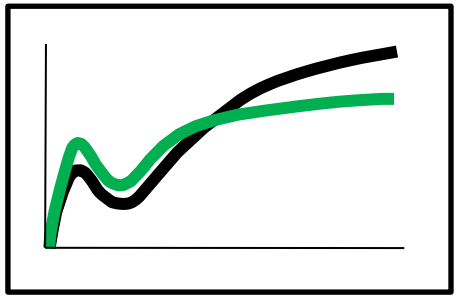
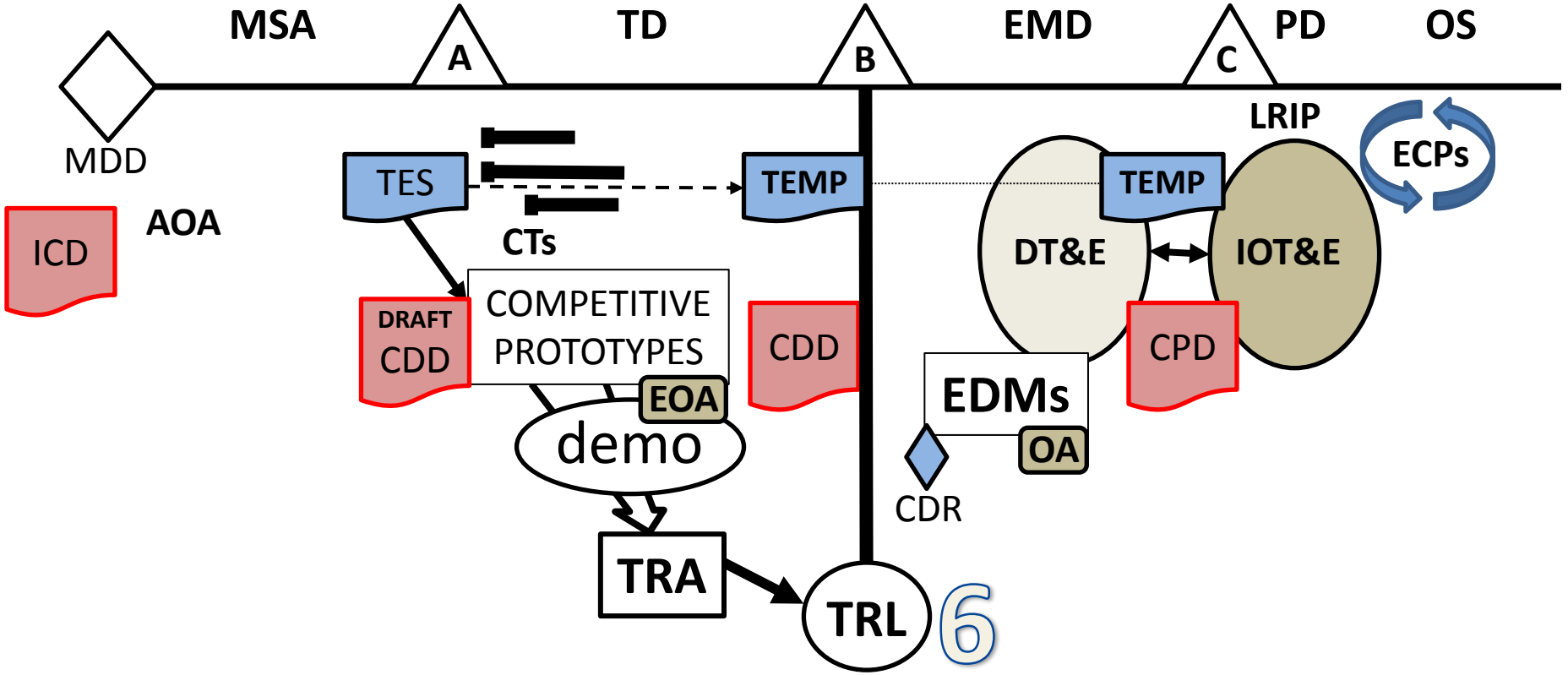
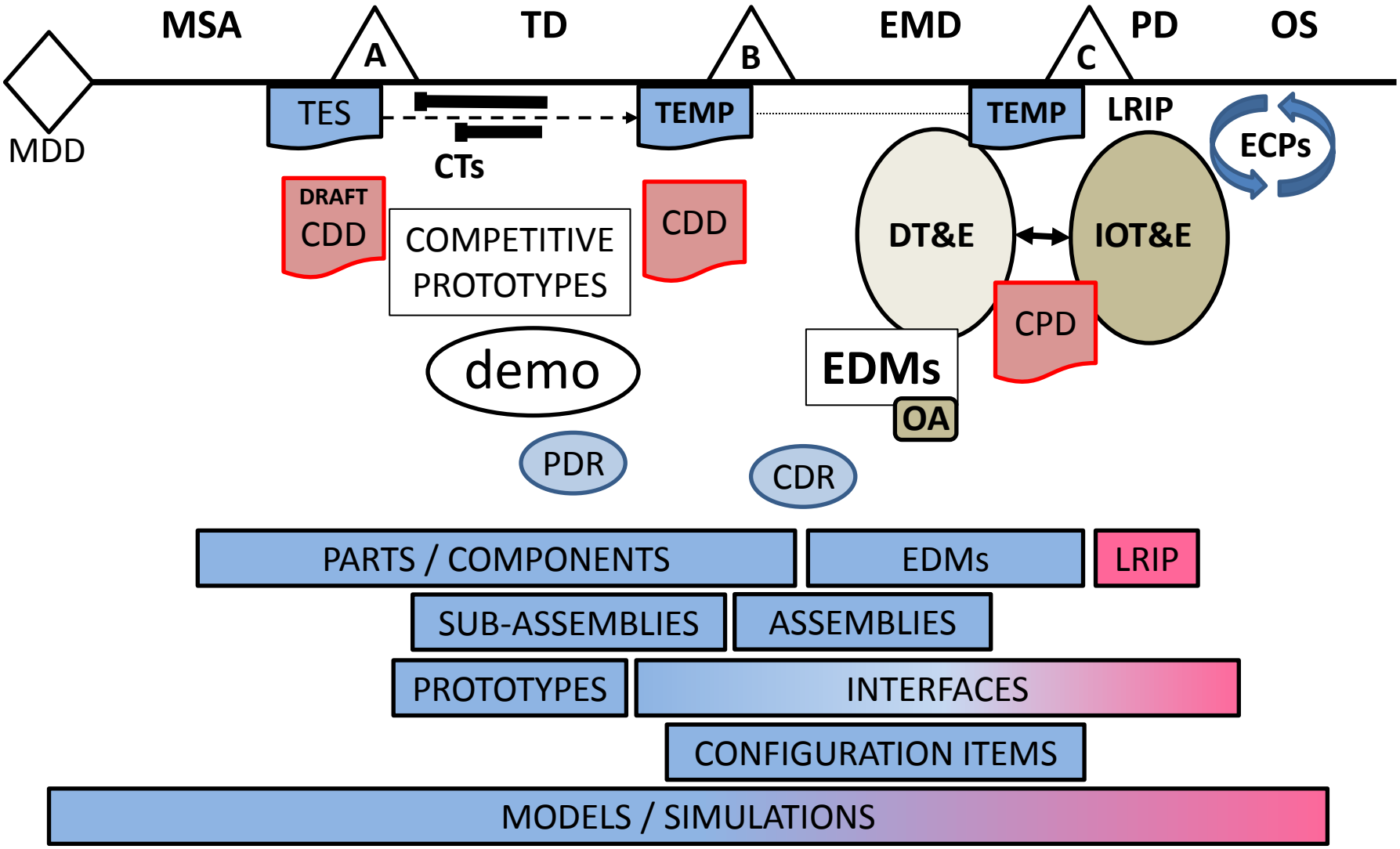


POLICY

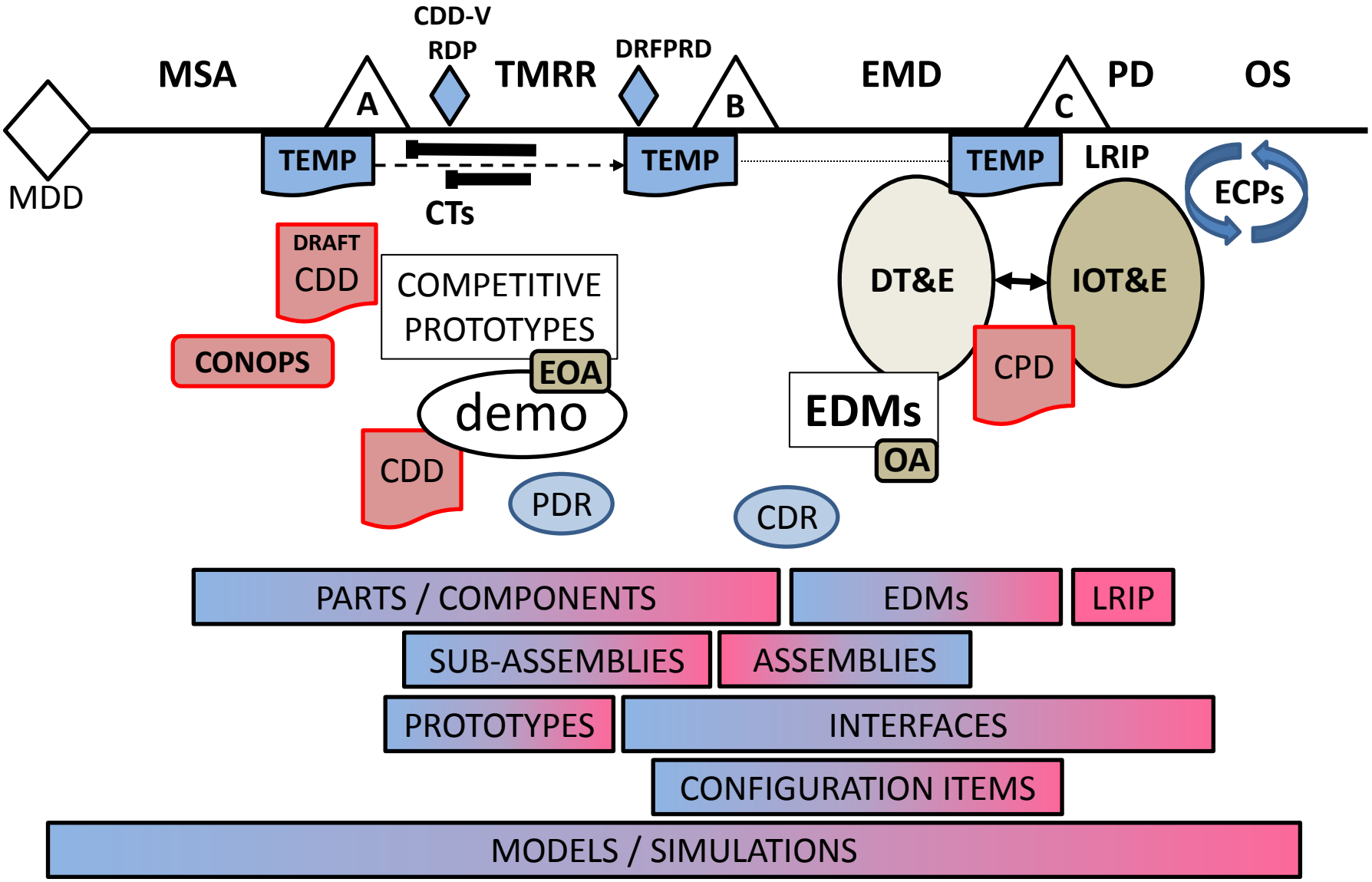
Acquisition Model



DODI 5000.02 2008



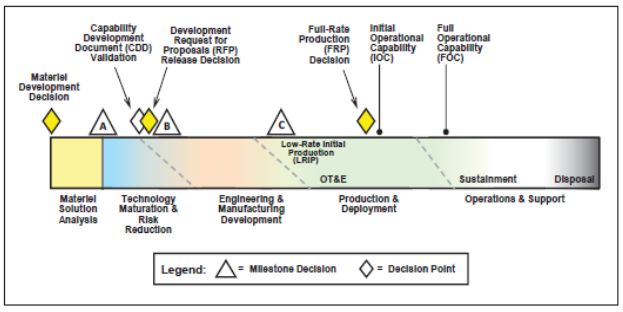
Interim DODI 5000.02 Nov 2013



Interim DODI 5000.02 Nov 2013

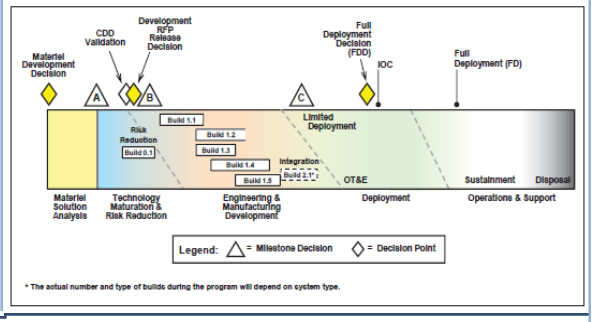
Hardware

Figure 3. Model 1: Hardware Intensive Program



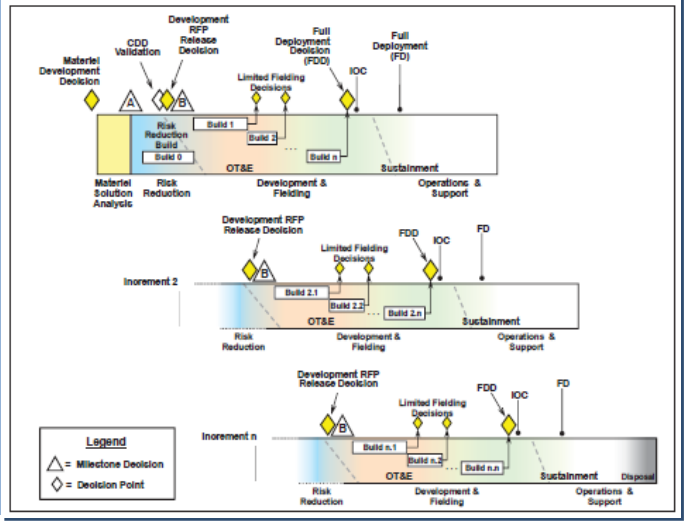
Software

Figure 4. Model 2: Defense Unique Software Intensive Program



Software Incremental

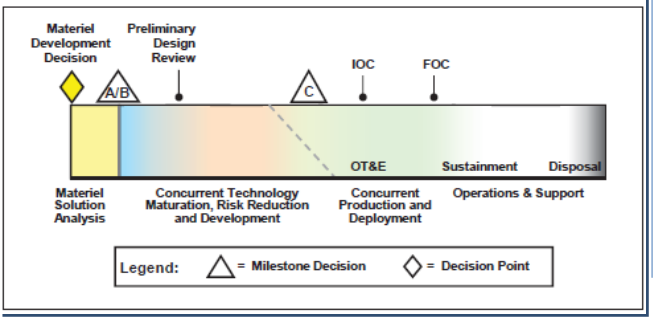
Figure 5. Model 3: Incrementally Fielded Software Intensive Program



Acquisition Models

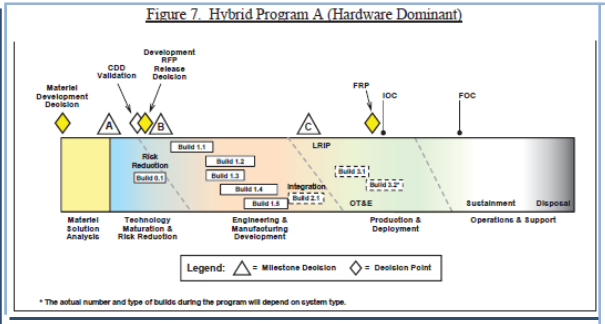
Accelerated

Figure 6. Model 4: Accelerated Acquisition Program



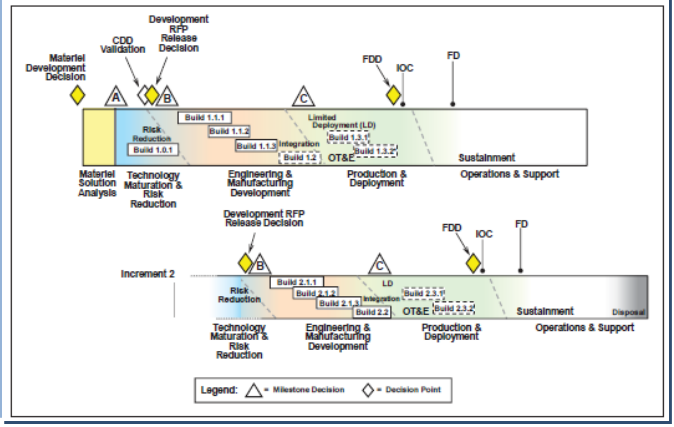
Hybrid #1

Figure 7. Hybrid Program A (Hardware Dominant)



Hybrid #2

Figure 8. Hybrid Program B (Software Dominant)



Additional Policy Changes

- CDT / LDTO
- DASD(DT&E) Assessment
- STAT - Factors/Levels
- Reliability Growth
- Cyber

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Recent Statutory Changes:

- FY12 NDAA, Section 835 - Management of DT&E for MDAPs

- FY13 NDAA, Section 904 – DASD(DT&E) Additional Responsibilities and Resources

FY12 NDAA, Sec. 835 – DT&E

Each Major Defense Acquisition Program (MDAP) must have a Chief Developmental Tester, responsible for:

- Coordinating the planning, management, and oversight of all DT&E activities for the program
- Maintaining insight into contractor activities under the program
- Overseeing the T&E activities of other participating government activities under the program
- Helping program managers make technically informed, objective judgments about DT&E results under the program

FY12 NDAA, Sec. 835 – DT&E

Each Major Defense Acquisition Program (MDAP) must have a governmental test agency serving as Lead DT&E Organization for the program, responsible for:

- Providing technical expertise on T&E issues to the chief developmental tester for the program
- Conducting DT&E activities for the program, as directed by the chief developmental tester
- Assisting the chief developmental tester in providing oversight of contractors under the program
- Assisting the chief developmental tester in reaching technically informed, objective judgments about DT&E results under the program

FY13 NDAA, Sec. 904 – DASD(DT&E)

- Additional DASD(DT&E) Responsibilities and Resources:
  - Direct communications with USD(AT&L) without "without obtaining the approval or concurrence of any other official within the Department of Defense"
  - Disapproval authority granted in addition to previously granted approval authority
  - Consult with Assistant Secretary of Defense for Research and Engineering to "assess the technological maturity and integration risk of critical technologies at key stages in the acquisition process"
  - Annual Report to Congress Shall include separate sections on
    - TRMC for the prior year
    - Adequacy of resourcing for both DASD(DT&E) and the Lead DT Organizations within the Military Departments, "to carry out the responsibilities prescribed by this section"

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3030 DEFENSE PENTAGON
WASHINGTON, DC 20301-3030

RESEARCH
AND ENGINEERING

APR 19 2013

Dr. Steven J. Hutchison
Acting Deputy Assistant Secretary of Defense for
Developmental Test and Evaluation

MEMORANDUM FOR DASD(DT&E) STAFF
SUBJECT: DASD(DT&E) Priorities

… focusing program engagement on test strategies that are simultaneously more efficient *and more comprehensive,* consistent with the overarching theme of Better Buying Power 2.0.

Mission: Right information, right time.

Our primary mission is to provide the USD(AT&L) and the Secretary of Defense with timely and objective assessments of acquisition programs at key decision points

… develop a continuum of DT&E knowledge as systems are developed and provide our assessment prior to major milestone decisions.

… to improve the timing, content, and quality, we will publish a comprehensive DT&E Assessment at each critical decision point, with particular emphasis at Milestone C.

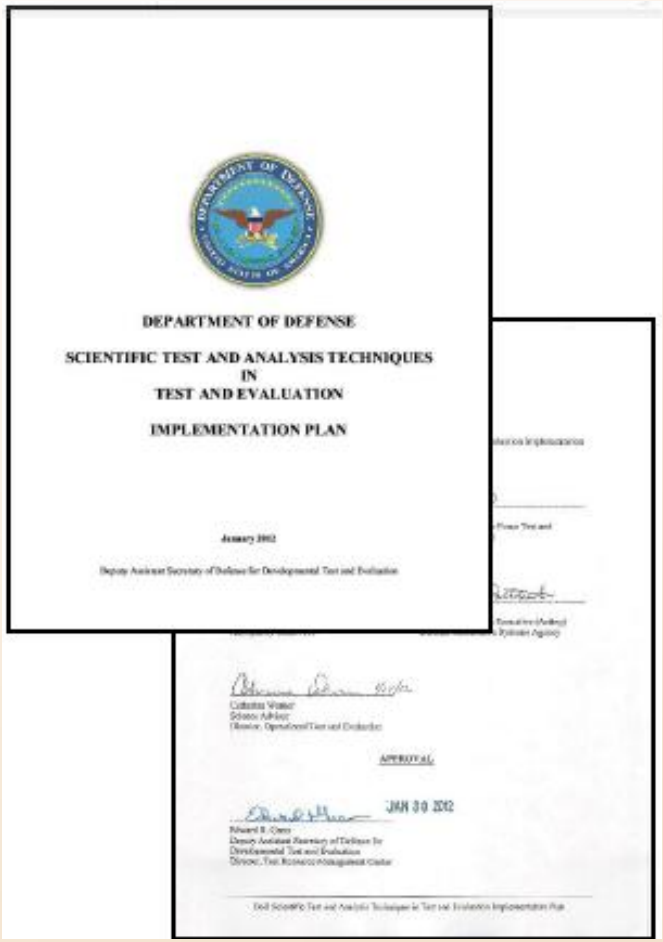
Formerly Assessment of Operational Test Readiness (AOTR) was conducted in conjunction with the Operational Test Readiness Review (OTRR) AFTER Milestone C

To reduce discovery of deficiencies late in the acquisition cycle, we must advocate test strategies and plans that ensure rigorous developmental testing with greater mission context to evaluate performance and reliability, and increase emphasis on interoperability and cybersecuritv.

Priorities - In our engagement with programs, DASD(DT&E) will focus on the following priorities:
1. Improve efficiency of DT&E activities, 2. Improve reliability, 3. Improve interoperability, 4. Improve cybersecurity

Scientific Test and Analysis Techniques (STAT) in T&E

Scientific Test and Analysis Techniques in T&E Implementation Plan



- The STAT in T&E Implementation Plan provides guidance for increasing the scientific and statistical rigor within the T&E planning, execution, and analysis capability.
- Intent is to apply the appropriate methods (Statistics, DOE, Integrated Test, etc.) during the development of the T&E planning, execution and assessment process.
- End State
  - Increase T&E efficiencies and effectiveness
  - Enable PMs to make better informed decisions based on acceptable risk thresholds.
- The STAT T&E COE is a “Critical” element of the overall STAT in T&E Implementation plan.

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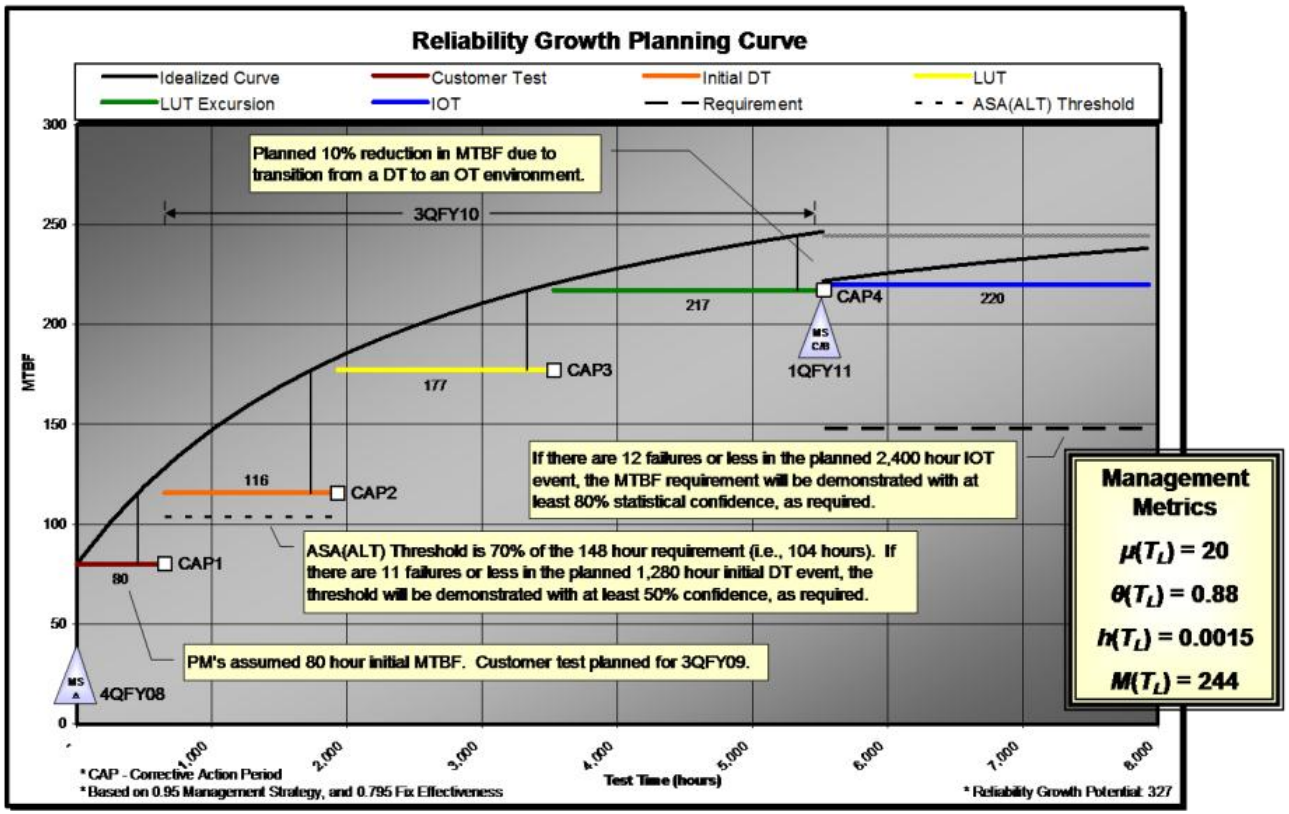
Reliability Growth

and why it's important to Defense Acquisition Programs



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1700 DEFENSE PENTAGON
WASHINGTON, DC 20301-1700

OPERATIONAL TEST
AND EVALUATION

NOV 24 2009

MEMORANDUM FOR DOT&E STAFF

SUBJECT: Test and Evaluation (T&E) Initiatives

• • •

Substantially improve suitability before IOT&E. To accomplish this initiative, DOT&E staff will do the following:

- Assess at appropriate milestones whether programs meet the requirement to have a reliability growth program and identify for action by DOT&E leadership cases where this requirement is not met;
- Work with developmental testers to incorporate in the TEMP a reliability growth curve or software failure profile, reliability tests during development, and evaluation of reliability growth and reliability potential during development;
- Work with developmental testers to assure data from the test program are adequate to enable prediction with statistical rigor of reliability growth potential and expected lOT&E results. The rigor should be sufficient to calculate the probabilities of accepting a bad system and rejecting a good system and those probabilities should be used to plan IOT&E. For new or restructured programs DOT&E will not approve TESs and TEMPs lacking a reliability growth curve or software failure profile.

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WASHINGTON, DC 20301-1700

OPERATIONAL TEST
AND EVALUATION

JUN 30 2010

MEMORANDUM FOR PRINCIPAL DEPUTY UNDER SECRETARY OF DEFENSE
(ACQUISITION, TECHNOLOGY AND LOGISTICS)

SUBJECT: State of Reliability

I am writing to underscore the importance of system reliability as a major problem for Department of Defense (DoD) acquisitions. Poor reliability is a problem with major implications for cost. In particular, we have an opportunity to change system development to substantially reduce fielded system sustainment costs. The following data demonstrates sustainment costs -which are related directly to reliability -dominate total system costs:

Type System	RDT&E	Procurement	Operations & Sustainment
Fixed Wing Fighters	9%	30%	62%
Ground Systems	4%	24%	73%
Rotary Wing	6%	29%	64%
Surface Ships	1%	31%	68%

Sustainment costs have five to ten times more impact on total life cycle costs than do RDT&E costs. Unreliable systems have higher sustainment costs because, quite plainly, they break more frequently than planned. If we improve system reliability in development it will reduce sustainment cost. Studies DOT&E has sponsored indicate at least a seven-fold payback for this up-front investment in better reliability.

DOT&E "State of Reliability" memo to USD(AT&L)

OPERATIONAL TEST AND EVALUATION

JUN 30 2010

There is no question the systems emerging from our design and development efforts are often not reliable. Poor reliability leads to higher sustainment costs for replacement spares, maintenance, repair parts, facilities, staff, etc. Poor reliability hinders warfighter effectiveness and can essentially render weapons useless.

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Reliability constraints must be pushed as far to the left as possible.

• • •

Our 2009 Annual Report shows no improvement for suitability in the past year. We looked at compliance with the acquisition policy mandating a reliability growth program. We found that only 44 percent of programs on oversight and reviewed have a reliability plan, and only 45 percent of programs are tracking reliability. Of the programs on DOT&E's current oversight list that have completed IOT&E, 66 percent met their reliability requirements.

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In May 2008, a Defense Science Board (DSB) report concluded that "High suitability (reliability) failure rates were caused by the lack of a disciplined systems engineering process, including a robust reliability growth program."

• • •

We know the problem persists. We know that it results in higher costs and less effective systems. We know more stringent engineering is required to deliver reliable products. To that end, industry must be made aware that all our contracts will require, at a minimum, the system engineering practices of ANSI/GEIA STD-0009.

J. Michael Gilmore
Director

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION,
TECHNOLOGY
AND LOGISTICS

March 21, 2011

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DEPUTY CHIEF MANAGEMENT OFFICER
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DIRECTOR, COST ASSESSMENT AND PROGRAM EVALUATION
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTOR, NET ASSESSMENT
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DoD FIELD ACTIVITIES

SUBJECT: Directive-Type Memorandum (DTM) 11-003 – Reliability Analysis, Planning, Tracking, and Reporting

ACQUISITION, TECHNOLOGY AND LOGISTICS

Directive-Type Memorandum (DTM) 11-003 - Reliability Analysis, Planning, Tracking, and Reporting

March 21, 2011

Purpose. In accordance with the authority in Reference (a) - DoD Directive 5134.01 – USD(AT&L), this DTM, consistent with the direction of the Under Secretary of Defense for Acquisition, Technology, and Logistics to immediately enhance reliability in the acquisition process …

- Amplifies procedures in Reference (b) and is designed to improve reliability analysis, planning, tracking, and reporting.
- Institutionalizes reliability planning methods and reporting requirements timed to key acquisition activities to monitor reliability growth.
- Is effective upon its publication to the DoD Issuances Website; it shall be incorporated into Reference (b) - DODI 5000.02

This DTM applies to:

- OSD, the Military Departments, … and all other organizational entities within the DoD.
- Major Defense Acquisition Programs (except Information Systems) and designated special interest programs.

Frank Kendall
Acting

ACQUISITION, TECHNOLOGY AND LOGISTICS

Directive-Type Memorandum (DTM) 11-003 -
Reliability Analysis, Planning, Tracking, and Reporting

March 21, 2011

ATTACHMENT

PROCEDURES

1. Program Managers (PMs) shall formulate a comprehensive reliability and maintainability (R&M) program using an appropriate reliability growth strategy to improve R&M performance until R&M requirements are satisfied. The program will consist of engineering activities including: R&M allocations, block diagrams and predictions; failure definitions and scoring criteria; failure mode, effects and criticality analysis; maintainability and built-in test demonstrations; reliability growth testing at the system and subsystem level; and a failure reporting and corrective action system maintained through design, development, production, and sustainment. The R&M program is an integral part of the systems engineering process.

2. The lead DoD Component and the PM, or equivalent, shall prepare a preliminary Reliability, Availability, Maintainability, and Cost Rationale Report … shall be attached to the Systems Engineering Plan (SEP) at MS A and updated in support of MS B and C.

3. The Technology Development Strategy preceding MS A and the Acquisition Strategy preceding MS B and C shall specify how the sustainment characteristics of the materiel solution resulting from the analysis of alternatives and the Capability Development Document sustainment key performance parameter thresholds have been translated into R&M design requirements and contract specifications.

4. Reliability Growth Curves (RGC) shall reflect the reliability growth strategy and be employed to plan, illustrate, and report reliability growth. A RGC shall be included in the SEP at MS A, and updated in the TEMP beginning at MS B.

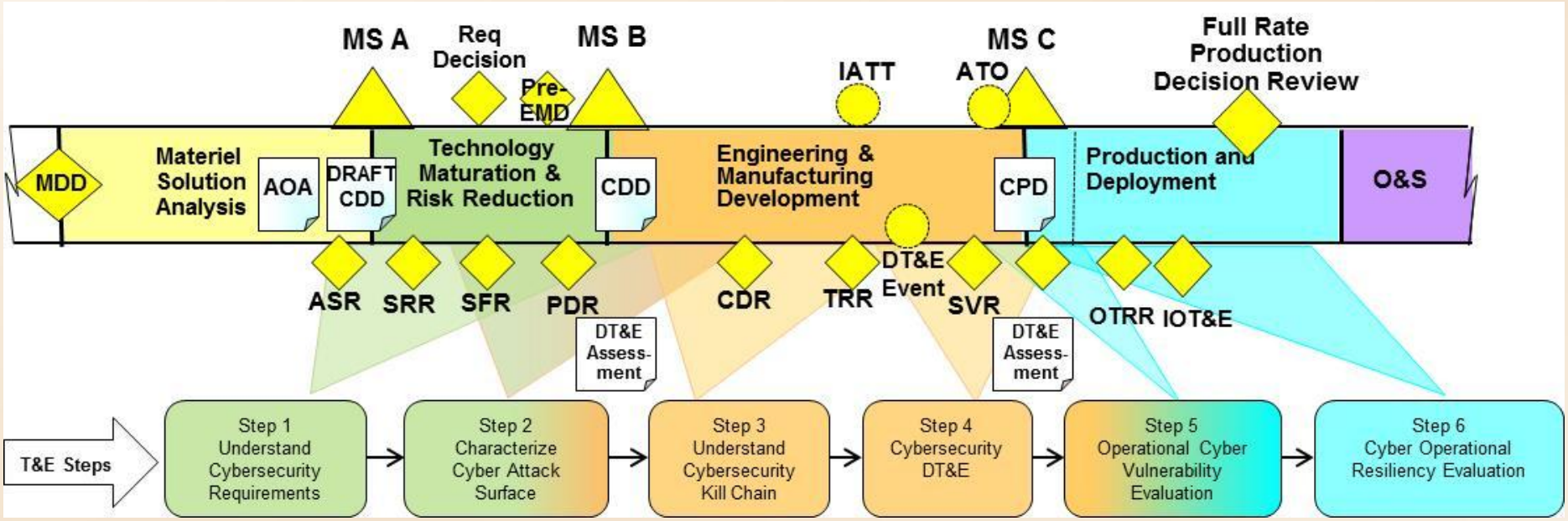
DRAFT Cybersecurity T&E Process

References:

- Draft DoDI 8500.01, Cybersecurity
- Draft DoDI 8510.01, Risk Management Framework (RMF) for DoD IT
- Draft PM Cybersecurity Implementation Guide

Cybersecurity T&E Process Overview

- A key feature of the Cybersecurity T&E Process is early T&E involvement in test planning and execution.
- Test planning occurs in all six steps and is reflected in the TEMP.
- The Cybersecurity T&E Process is iterative, i.e., steps may be repeated several times in different lifecycle phases due to changes in the system architecture, new or emerging threats, and changes to the system environment.
- All steps are performed regardless of where the system enters the process.



QUESTIONS ?